2022

MCA

2nd Semester Examination

NUMERICAL METHODS AND OPTIMIZATION TECHNIQUE LAB.

PAPER—MCA-296

(Practical)

Full Marks : 100

Time : 3 Hours

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Attempt one question from each section.

Section A : *Numerical Analysis*

Answer any *one* question. 1×40

1. Write a program for the Newton Backward interpolation formula to find f(1941) from the table :

x	1891	1901	1911	1921	1931
y	46	66	81	93	101

2. Write a program in C to find the root of the following equation using Secant method $f(x) = x^3 - x - 1$.

3. Write a program to find

$$\int_0^1 \frac{\sin x}{x} dx .$$

By Simpson's 1/3 formula by taking 10 intervals.

4. Write a program to find a real root of the equation $x - e^{-x} = 0$ using Regula Falsi method.

5. Write a program to solve the following linear equations by Gauss-Seidal method :

$$x - 4y + 12z = 6$$
$$2x - 9y + 4z = 12$$
$$7x + 3y + z = 18$$

6. Write a program to find the value of $\frac{dy}{dx} = \frac{y - x}{1 + x}$ given

$y(0) = 1$, find $y(0.1)$ by taking $h = 0.02$ by Runge Kutta 4th order formula.

Section B : *Optimization Technique*

Answer any *one* question. 1×40

7. Write a program in C/C++ to find the solution to the following transportation problem :

	D_1	D_2	D_3	D_4	Available
O_1	7	9	3	2	16
O_2	4	4	3	5	14
O_3	6	4	5	8	20
Demand	11	9	22	8	

8. Write a program in C/C++ to find the solution to the following Linear Programming problem using simplex method :

$$\text{Max } Z = -5x_1 + 5x_2 + 12x_3$$
$$\text{such that } -x_1 + x_2 + 3x_3 \leq 20$$
$$12x_1 + 4x_2 + 10x_3 \leq 90$$
$$x_1, x_2, x_3 \geq 0$$

9. Write a program in C/C++ to find the solution to the following Linear Programming problem using simplex method :

$$\text{Min } Z = 20x_1 + 40x_2$$
$$\text{such that } 36x_1 + 6x_2 \leq 108$$
$$3x_1 + 12x_2 \geq 36$$
$$20x_1 + 10x_2 \geq 100$$
$$x_1, x_2 \geq 0$$

10. Write a program in C/C++ to find the solution to the following transportation problem :

Source	Destination →				Available
		D_1	D_2	D_3	D_4
S1	4	6	8	8	40
S2	6	8	6	7	60
S3	5	7	6	8	50
Demand	20	30	50	50	

[PNB + Viva – 20]